REMARKS

Claims 1-14 and 16 are pending in this application. By this Amendment, claim 15 is cancelled without prejudice to or disclaimer of the subject matter contained therein, and claims 1-14 and 16 are amended. Claim 1 is amended to incorporate features from claims 6 and 9, claims 5 and 8 are rewritten into independent form and amended to incorporate features from claims 6 and 9, respectively, and claims 2-4, 6, 7, 9-14 and 16 are amended to correct claim dependencies and/or for clarity. Features for claims 1, 5 and 8 are also supported in Figs. 1-4. No new matter is added by any of these amendments.

Reconsideration based on the following remarks is respectfully requested.

I. Claim 7 Satisfies the Requirements under 35 U.S.C. §112, second paragraph

The Office Action rejects claim 7 under 35 U.S.C. §112, second paragraph, as being indefinite. Claim 7 has not been amended to obviate this rejection. Instead, this rejection is respectfully traversed. The mere recitation of a carrier being disposed within a vacuum chamber does not require step a) to be performed under vacuum. Withdrawal of the rejection under 35 U.S.C. §112, second paragraph is respectfully requested.

II. Claims 1-14 and 16 Define Patentable Subject Matter

The Office Action rejects claims 1-16 under 35 U.S.C. §103(a) over PCT Patent Publication WO 00/18978 to Weinert (hereinafter "Weinert '978" and corresponding to U.S. Patent 6,270,840 B1) in view of U.S. Patent 6,376,018 to Kittler, Jr. (hereinafter "Kittler"). This rejection is rendered moot with respect to claim 15, and is respectfully traversed for the remaining claims.

Weinert '978 and Kittler do not teach or suggest a process for producing plane-parallel platelets, including a) coating a partial surface of a rigid carrier with a separating agent and at least one product layer, the rigid carrier being rotatable about an axis normal to the partial surface, the rigid carrier being disposed in a vacuum chamber, b) transporting the

partial surface by rotation of the rigid carrier, c) stripping the product layer from the partial surface of the rigid carrier, such that plane-parallel platelets are produced, wherein steps a), b) and c) are performed continuously and concurrently on different partial surfaces of the rigid carrier, as recited in claim 1. Similarly Weinert '978 and Kittler do not teach or suggest the method steps as described above, wherein steps a) and b) are performed during at least one rotation of the rigid carrier for each of the separating agent and the at least one product layer, and are followed by step c), as recited in claim 5.

Further, Weinert '978 and Kittler fail to teach or suggest an apparatus for producing plane-parallel platelets, in particular for implementing the process, including a rigid carrier disposed in a vacuum chamber, the rigid carrier having a partial surface and being rotatable about an axis normal to the partial surface, separator coating means for coating said rigid carrier with a separating agent, product coating means for coating the partial surface of the rigid carrier with at least one product layer over the separating agent, stripping means for stripping the product layer from the partial surface of the rigid carrier such that plane-parallel platelets are produced, wherein the partial surface between the product coating means and the stripping means is transported by rotation of the rigid carrier, as recited in claim 8. Nor do the applied references teach or suggest the apparatus further including an intermediate separation for creating two pressure stages disposed between said coating means and said stripping means, as recited in claim 9.

Examples of these structures are described at page 7, line 23 – page 13, line 13 and Figs. 1-6 of Applicant's specification. In particular, the rigid carrier (disc 5, 51a, 51b) is mounted on a shaft (6, 52) having a rotation axis within a vacuum chamber (100). A separator layer (71) of separating agent is applied to the rigid carrier by evaporator means (8), superposed by at least one product layer (73) that is applied by evaporator means (9a, 9b, 9c).

The vacuum chamber includes a vessel (18) containing stripping means (bath 13 and/or scraper 21) for stripping the product layer from the rigid carrier (5, 51a, 51b).

Applicant's claimed features also provide intermediate separators (as narrow passages 12a, 12b) disposed between the product coating means and the stripping means that subdivide the vacuum chamber into two pressure stages (*i.e.*, separately pumped zones), thus enabling concurrent product deposition and product stripping at different portions (arc segments) of the rigid carrier. The separating agent and product on the rigid carrier are disposed into contact with a liquid to form a slurry. The separating agent is soluble in the liquid, such as water, a secondary alcohol or a tertiary alcohol that have low vapor pressure. The product is removed from the slurry as solid flakes (*e.g.*, by filtering or centrifuging), with the product further processed, and the slurry recirculated.

Instead, Weinert '978 discloses a belt-type vapor deposition apparatus 100. In particular, Weinert '978 teaches a vacuum chamber 1 subdivided into a vapor deposition chamber 2 and a stripping chamber 7, with an endless belt 5 passing through both chambers as a substrate. Weinert '978 further teaches an evaporator 3 applying a water-soluble separating agent as a thin film to the belt 5, and evaporators 4a, 4b and 4c applying to the film a product, which is stripped from the belt 5 (page 9, line 9 – page 10, line 7 and Fig. 1 of Weinert '978).

Applicant's claimed features are directed to a rigid carrier is clearly distinguished from the flexible belt taught by Weinert '978. Thus, Weinert '978 teaches away from Applicant's claimed features.

Further, Kittler discloses a method for producing thin film particles 11. In particular, Kittler teaches a vacuum chamber 20 in which a surface coating 12 is deposited onto a moving drum cylindrical surface 14, and depositing thin film layers 16 providing a thin film structure 18 that is scraped from the coating 12 (col. 2, lines 35-52 and Fig. 1 of Kittler).

Applicant respectfully submits that the rotation axis of the Kittler drum 14 is parallel to its surface, in contrast to being normal, as provided in Applicant's claimed features.

Applicant also asserts that Kittler precoats the drum 14 with a wax-like material, followed by the deposition of a thin film layer, such as aluminum and others. As the drum rotates, wax and aluminum are freshly deposited onto the cylindrical surface and scraped off. The result is a mix of wax and metal flake material requiring separation outside the vacuum chamber by a strong solvent that can dissolve wax, such as by using liquid CO_2 under 36 bar in an extra-high-pressure unit. In contrast, Applicant's claimed features permit coating and stripping operations on different partial surfaces concurrently and continuously within the vacuum chamber as the rigid carrier rotates.

Because aluminum flakes have a typical thickness of ~50 to 100 nanometers (2 to 4 millionth of an inch), arranging scraping blades to maintain this thickness range is extremely difficult. Such blades must be precision parts, and they are exposed to wear.

Furthermore, the mix of wax with finely dispersed flake material requires utmost care in handling. Wax and aluminum powder produce an extremely flammable mix that is used as a major ingredient in incendiary weapons and in solid rocket propellants.

Another aspect is that a drum fully coated with any wax will have an appreciable re-evaporation of wax from the cooled drum. Even at +20°C surface temperature at the wax-coated drum, waxes still have vapor pressure of more than 0.1 mbar, while the necessary pressures for evaporation surrounding the drum is between 10^{-3} to 10^{-4} mbar. Thus, the evaporation pressure is two or three orders of magnitude lower than the wax vapor pressure. The wax vapor, which re-evaporates from the entire drum surface, will inevitably react with the 1450°C hot aluminum vapor emanating from the evaporation sources. The waxes, being hydrocarbons, will invariably form aluminum carbide Al_4C_3 under these conditions. The

aluminum carbide will condense on the waxy drum surface, and thereby impede the deposit formation of a highly reflecting aluminum flakes.

Kittler provides a process that requires periodic removal of the wax and product mix at frequent intervals and in small quantities. The heat flux (combined from convection and radiation) from such deposition and removal of the aluminum is about 30 kW/m^2. These conditions lead to a large temperature difference (ΔT) between the drum surface and the outer coated layer. Taking into account the thermal conductivity of waxes of ~0.2 W/m-°K lead to a ΔT of 150°C between the outer surface and the drum surface when such a coating package reaches a thickness of only one millimeter. Surface temperatures at the outer layer with waxes are 130°C. Melting and re-evaporation of the waxes would ensue, even well below 100°C, which is stated in the patent description for ROBAWAXES™. Applicant has determined in the laboratory that such waxes show considerable re-evaporation even at 50°C, impeding the condensation of aluminum on the surface.

Applicant's claimed features permit, in various embodiments, inorganic or organic separating agents. Kittler teaches use of waxes, which, as explained above, have disadvantages as compared to inorganic separating agents. In contrast, inorganic separating agents have thermal conductivity of ~1 W/m-°K, leading to much lower ΔT between the product and the rigid carrier than for waxes. Further, inorganic separating agents have much higher melting and disassociating temperatures than their organic counterparts.

Applicant explains that the claimed features enable production of structured flakes without reverting to pre-embossed plastic film, such as described in U.S. Patent 6,761,939 to Bonkowski *et al.* Holographic structures on plastic film have ridges less than 0.001 mm deep, that can be easily damaged during handling. Such films permit only a very limited number of re-uses, whereas a structured metal plate, such as a rigid substrate, provides a more permanent carrier and is not as subject to wear. As described in the specification at page 21,

lines 15-16, the rigid carrier may include a surface that is alternatively natural, polished, or structured.

Applicant further explains the advantages of the claimed features by asserting that a rigid surface, preferably a disc, is continually rotated under high vacuum. The inorganic material forms a soluble separating (or releasing) agent on the rigid surface. Concurrently, but at a different angular position in the direction of rotation, the material which forms the product is evaporated onto the release layer. As the disc surface rotates, the coated area consisting of the separating and product films is brought into contact with the liquid for detaching the evaporated layers from the disc surface by dissolution to form the slurry.

Applicant's claimed features provide that depositing and stripping operations can be continued under vacuum provided that sufficient evaporant is available in the evaporation sources. The precipitation of the product from the liquid can be performed at ambient conditions. The liquid can be fed back into the vacuum system to dissolve inorganic release material time and again, until the concentration of the separating agent becomes undesirably high. Inorganic separating agents have an extremely low vapor pressure at ambient temperature of less than 10 mbar, which are too low to sustain combustion, thus preventing reaction with the product material, *e.g.*, aluminum. In addition, because of the higher decomposition and melting temperatures and higher thermal conductivity of inorganic separating agents (compared to waxes), decomposition and melting are avoided.

Further, there is no motivation to combine features related to the belt deposition of Weinert '978 with the wax-coated drum deposition of Kittler, nor has the Office Action established sufficient motivation for a *prima facie* case of obviousness. Even assuming that motivation to combine the applied references is established, the combination fails to teach or suggest Applicant's claimed features.

Applicant asserts that the Examiner's allegation that it would have been obvious to one of ordinary skill in the art to implement interchanging of belts and rollers is merely a conclusory statement, and that no support for such a statement has been provided. When relying on what is asserted to be general knowledge to negate patentability, that knowledge must be articulated and placed on the record. Providing only conclusory statements when dealing with particular combinations of prior art in specific claims cannot support an assertion of obviousness. *In re Lee*, 61 USPQ 2d 1430, 1434-35 (Fed. Cir. 2002).

Applicant respectfully asserts that employment of the continuous belt, as taught in Weinert '978, would not function as a substitute for the rigid carrier recited in the claims. Further, substitution of the drum in Kittler does not provide for rotating about an axis normal to the partial surface. Neither Weinert '978 nor Kittler teaches these carrier features, nor does either reference suggest motivation to modify their teachings to provide such features, or provide any expectation of success were such features employed.

Although the Examiner may take official notice of facts outside of the record which are capable of instant and unquestionable demonstration as being "well known" in the art, "if the applicant traverses such an assertion, the Examiner should cite a reference in support of his or her position" (MPEP §2144.03). Thus, Applicant submits that the reliance on unsupported *per se* knowledge does not negate the patentability of the subject matter of claims 1 and 8, nor has a *prima facie* case of obviousness been established.

A *prima facie* case of obviousness for a §103 rejection requires satisfaction of three basic criteria: there must be some suggestion or motivation either in the references or knowledge generally available to modify the references or combine reference teachings, a reasonable expectation of success, and the references must teach or suggest all the claim limitations (MPEP §706.02(j)). Applicant asserts that the Office Action fails to satisfy these requirements with Weinert and Kittler.

For at least these reasons, Applicant respectfully asserts that the independent claims are now patentable over the applied references. The dependent claims are likewise patentable over the applied references for at least the reasons discussed as well as for the additional features they recite. Consequently, all the claims are in condition for allowance. Thus, Applicant respectfully requests that the rejections under 35 U.S.C. §103 be withdrawn.

III. Conclusion

In view of the foregoing amendments and remarks, Applicant respectfully submits that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicant's undersigned representative at the telephone number listed below.

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